

## Exploring close consumer-producer links to maintain and enhance on-farm biodiversity

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### Abstract

*This paper deals with the question of whether local selling of farm products improves on-farm biodiversity. In contrast to the main agricultural trend of farms specialising and increasing in size in response to the national and global markets, increasing numbers of Swedish farmers are instead diverting their efforts towards selling at local markets. Based on a study of six farms, the paper explores the nature of diversity on these farms and identifies factors supporting diversity. The study shows that farmers who interact with consumers are encouraged to diversify their production. The actual crops and varieties grown are determined by a combination of the natural conditions prevailing on the farm and the conditions created by the farmer in terms of marketing strategy for the products.*

### Introduction

Although the relationships between landscape heterogeneity, biodiversity and the provision of ecosystem services are not fully understood, a number of studies strongly support the idea that reduced heterogeneity in the agricultural landscape reduces the biodiversity and affects the generation of ecosystem services negatively (Altieri, 1999; Benton et al., 2003; Tscharntke et al., 2005). Thus agricultural heterogeneity – in the sense of e.g. habitat diversity of natural pastures, varieties in crop sequences and fields with extensively cultivated border strips – is of crucial importance for the maintenance of biodiversity, as it provides food, shelter and nursery areas for wild flora and fauna (Benton et al., 2003). The species making up the diversity, including their complex and still largely unknown interactions, are in turn crucial for the generation of ecosystem services (Daily, 1997), such as the maintenance of soil structure and fertility, local hydrological cycles and recirculation of nutrients. As these services support agricultural productivity, they are important for the development of more sustainable agriculture. They are decisive for the adaptability of agriculture to the demands for food and raw material under changing environment and climatic conditions, as well as for the prospect of reducing the use of non-renewable resources (Tilman et al., 2002). Despite EU subsidies aimed at inspiring and supporting farmers to adopt practices that maintain biodiversity, the heterogeneity and diversity of the agricultural landscape of Europe is threatened today (Donald et al., 2006). In contrast

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to this mainstream trend in agriculture, a group of farmers seem to base their enterprises on continuous diversification, not only in terms of crop species, but also when it comes to methods for product processing and spreading of socio-economic risks. These farmers depend on local markets, which enable frequent face-to-face communication with customers and/or end-consumers. In this paper, we explore the nature of these aspects of diversity and discuss some effects and potential underlying driving forces. Some types of farms are more suited for selling locally than others (Tscharntke et al., 2005). Studies in the United States show that farms with fruit and vegetables are by far the most represented at local markets. Farms that sell locally are also to a large extent certified organic or in practice producing organically though not certified (Tscharntke et al., 2005). Welsh and Lyson (1997) showed that farms that sold on local markets had smaller average herd size, were less likely to use chemical pesticides and fertilisers and also adopted an intensive rotational grazing system that reduced purchased inputs rather than maximised production, in comparison with farmers selling to conventional milk buyers. Furthermore, engagement with customers and other farmers at local markets contributes to social learning, enhancing innovation in marketing and vending and increasing the likelihood of producers diversifying to sell on additional markets.

## **Material and methods**

Both quantitative and qualitative methods were used in this research. Quantitative methods such as transect walks and data from geographical information system (GIS) were used to assess physical features of the farms, e.g. the numbers of crops grown and the mosaic of the farmland and the landscape surrounding the farm. Qualitative methods, mainly interviews and observations, were used to collect physical data and to explore any relationship between the feature of the farms, the perception of the farmers and the characteristics of their selling. The study material comprised six Swedish organic farms, of which three specialise in horticulture; two mainly rear animals (sheep or cows); and one mainly produces cereals and sells mill products. The farms sell locally from the farm gate, at farmers' markets, directly to local grocery stores, schools and restaurants and/or direct to consumers through the Internet. One of the farms is run as a type of Community Supported Agriculture (CSA). The word 'local' was not defined in terms of geographical distance between producers and consumers. We assumed that food systems that enable personal meetings between the actors involved were sufficiently 'local' for the purposes of the study. The assessments of cultivated and habitat diversity on the farms were used in order to decide the degree of planned and associated diversity respectively (Altieri, 1999). Planned biodiversity is the result of the crops and varieties that are grown on the farm, while associated biodiversity describes wild flora and fauna present as a result of the farming practices.

## **Results and discussion**

Local selling was of considerable importance for the economy of the six farms, as it comprised between 40% and 100% of farm income. For all farms, selling on local markets was a way to cut out the middlemen, thereby increasing the possibility to get higher prices for the products. The main factors characterising these study farms, in comparison with average Swedish farms on fertile plains selling the production to middlemen, are that they are relatively small and work-intensive and have a low monetary turnover and generally few purchased inputs. Saying this, one has to bear in mind the large variety of farm size and production methods in Sweden.

The number of different vegetables and the varieties of these grown on the vegetable farms were remarkable. The farmers on one farm grew 169 vegetable species/varieties while another grew 115. For example, one farm had nine different varieties of tomatoes and seven of white cabbage. The planned diversity also affected the size of the fields. The vegetable farmers often chose to separate cropping sequences into two separate sequences managed on separate parts of the farm, in order to secure appropriate growing conditions for all crops in respect to pest regulation and soil demands for different crops. In practice, this meant that larger fields were divided into smaller parts in a permanent mode. In essence, the field area on the vegetable farms was composed of a mosaic of different crops with broad field edges covered with grass. Different vegetables were grown in rows of a couple of metres, providing corridors of crops with different genetic composition and structural diversity. Such corridors are, depending on their character, known to be habitats for certain wild species, conduits for movement, barriers or filters separating areas or sources of environmental effect on the surrounding areas. This mosaic created heterogeneity at field level, making up a diversity of habitats supporting wild flora and fauna.

According to the interviews, the vegetable farmers had a strong interest in diversifying their vegetable production, and the local market made this possible. The farmers gave several reasons for the actual vegetables grown on their farms and the sequence in which they were grown on the fields. This proved to be a combination of the demands that the farmers perceived from the market and their interests and proficiency in optimising the conditions of their farm and enterprises. The actual crops and varieties grown were the result of a combination of the nature-given conditions on the farms and the conditions created by the farmer's marketing strategy for products. The animal-producing farmers proved to have a different diversification strategy, driven by the opportunity to market meat locally and obtain a higher price for added value. These farms did not present any remarkable diversity in crops grown. The average field size was similar to that on other farms in the region (3-5 ha). The contribution to diversity from these farms was instead that by keeping grazing animals, they maintained the semi-natural pastures that are characteristic of the landscape in which the farms are located. In essence they did not produce diversity by what they were growing, but they maintained important diversity associated with their extensive way of rearing animals.

The semi-natural pastures that are maintained by interested farmers and their grazing animals are among the most diverse areas in the Swedish agricultural landscape. Half the threatened plant species on the Swedish Red List (Gärdenfors, 2005) are connected with the agricultural landscape and of these, a large proportion are connected with semi-natural pasture. One reason for rearing animals in this way was that the access to local markets and other alternative ways of sale involved options of communicating added value to consumers and thereby getting a higher price for produce. Therefore it is reasonable to argue that the option of getting paid for the added environmental value of this kind of production at a local market was an important factor for the sustainable management of these semi-natural pastures on the study farms. Without this option farmers would have been forced to choose more intensive or extensive production methods in order to survive. The farmers expressed a complex set of reasons why they chose to grow and sell so many different products. Our interviews with farmers and their customers indicated that consumer feedback was of utmost importance for farmer satisfaction, and one strong reason why they continued, even though it required a lot of work.

## Conclusion

The vegetable farms selling locally in our study introduce small-scale diversity due to the increased motivation to grow a variety of different crops. They contribute to planned diversity at field and farm level, which furthermore adds to wild flora and fauna in the landscape. The farms concentrated on animal husbandry maintain associated diversity due to their production being well adapted to species-rich semi-natural pastures. These pastures run a high risk of being abandoned according to the overall trend of extensification in such areas in Sweden. The farmers were better paid and received a great deal of positive feedback from consumers. Moreover, the farms, situated in a small-scale landscape, suited such kinds of production. The local selling made it possible to stay in business, without increasing in scale, which might be impossible according to the landscape or not commensurate with farmers' preferences. Consequently, selling locally forces them to diversify in order to perform better, as more products to sell:

- Spreads the financial risk, which is essential for the small producer
- Gives more income per customer visiting the market, due to the possibilities of offering more different kinds of products, leading to better income from participating
- Attracts greater numbers of customers, giving better income from participating
- Leads to more positive feedback from customers appreciating the abundance of variety

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